



GOVERNMENT OF INDIA
DEPARTMENT OF COMMERCE

REPORT OF THE INDIAN TARIFF BOARD

ON THE
CHLOROFORM, POTASSIUM PERMANGANATE, AND
ETHER SULPHURIC, P. B. AND ANAESTHETIC
INDUSTRIES

BOMBAY 1947

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सत्यमेव जयते

REPORT ON (a) CHLOROFORM, (b) POTASSIUM PERMANGANATE, AND (c) ETHER SULPHURIC P.B. AND ANAESTHETIC INDUSTRIES.

INTRODUCTORY

1. An application for protection to these industries was submitted to the **Application for protection.** Commerce Department, Government of India, by the Bengal Chemical and Pharmaceutical Works Ltd., Calcutta, on the 14th January 1946. Subsequently, they withdrew their application relating to chloroform in their letter dated the 16th September 1946, but at the public inquiry they requested that the case of chloroform may also be considered along with the other two chemicals. In addition, Chemicals Ltd., Nidadavolu, had also applied for protection to the potassium permanganate industry in their letter dated the 5th December 1945 addressed to Government. They, however, did not send any representative to the public inquiry.

2. The case of these three industries was referred to the Board for investigation into their claim for protection or assistance in **Reference to the Board.** the Government of India, Department of Commerce, Resolution No. 218-T(55)/45, dated the 4th May 1946.

3. The terms of reference to the Board, which are stated in the Resolution of the Government of India, Department of Commerce, No. 218-T(55)/45, dated the 3rd November 1945, are as follows :— **Terms of reference.**

“ In the case of each industry the Board will, after such examination as it considers necessary, report whether the industry satisfies the following conditions :—

(1) that it is established and conducted on sound business lines ;

(2) (a) that, having regard to the natural or economic advantages enjoyed by the industry and its actual or probable costs, it is likely within a reasonable time to develop sufficiently to be able to carry on successfully without protection or State assistance ; or

(b) that it is an industry to which it is desirable in the national interest to grant protection or assistance and that the probable cost of such protection or assistance to the community is not excessive.

Where a claim to protection or assistance is found to be established i.e., if condition (1) and condition (2) (a) or (b) are satisfied, the Board will recommend—

(i) whether, at what rate and in respect of what articles, or class or description of articles, a protective duty should be imposed ;

(ii) what additional or alternative measures should be taken to protect or assist the industry ; and

(iii) for what period, not exceeding three years, the tariff, or other measures recommended should remain in force.

In making its recommendations, the Board will give due weight to the interests of the consumer in the light of the prevailing conditions and also consider how the recommendations affect industries using the articles in respect of which protection is to be granted. Since relief, to be effective, should be afforded without delay, the Board is requested to complete its enquiries with all possible expedition and to submit a report as soon as the investigation of the claim of each industry is concluded."

4. After these industries were referred to the Board, a short preliminary questionnaire was sent to the known manufacturers and the Industries Department of the Government of India and the Provincial and State Governments, requesting them to furnish information regarding the installed capacity and actual production of the factories, the import of these chemicals from different countries in recent years, the existing import duties, etc. Valuable information, especially from the Industries Department of the Central Government, was received in response to this preliminary questionnaire. This preliminary questionnaire was followed by a detailed questionnaire, which was sent to a number of manufacturers, importers, and consumers, as well as certain associations representing chemical manufacturers' interests. A list of the firms or persons to whom the detailed questionnaire was issued is given in Appendix I. Since many of the manufacturers and the consumers were common for the three industries, it was decided to take them up for consideration at the same public inquiry. For the same reason, the Appendix I is common for the three industries, but it has been so arranged as to bring out for each industry the names of firms and organizations to whom the questionnaire was sent.

5. The Cost Accounts Officer deputed by the Board examined the costs of production of the Bengal Chemical and Pharmaceutical Works, Ltd., for chloroform, ether sulphuric P. B. and anaesthetic, and potassium permanganate. He also examined the costs of production of ether sulphuric P. B. and anaesthetic at the Alembic Chemical Works, Baroda.

6. The section of the factory of the Bengal Chemical and Pharmaceutical Works, Ltd., in which chloroform and potassium permanganate are manufactured, was visited by Dr. Nazir Ahmad on the 12th April 1946. He also visited the factory of the Indian Chemical Manufacturers, Ltd., Lahore, engaged in the production of potassium permanganate, on the 27th December 1946. The public inquiry into these three industries was held at Bombay on the 17th and 18th December 1946. A list of the persons representing firms, organizations and consumers' interests, who attended this inquiry, is given in Appendix II.

7. We shall now take up the case of each industry separately in three parts as follows : Part I, chloroform ; Part II, potassium permanganate ; and Part III, ether sulphuric P. B. and anaesthetic.

PART I.—CHLOROFORM

8. The representative of Alembic Chemical Works, Baroda, stated at the public inquiry that during 1932-1939 they had manufactured about 3,000 lbs. of chloroform per annum for their own consumption, but they did not place any of their product in the market. Thus, in the pre-war years, the production of chloroform in India was on a small scale, averaging about 3,000 lbs. per annum; while the imports were of the order of 2,50,000 lbs. per annum. In the early part of the war, there was an acute shortage of bleaching powder, which is one of the important raw materials for the manufacture of chloroform, and India was asked to step up her own production of chloroform, as it was emphasised that she was not likely to get any from foreign sources. The production capacity went up to 60,000 lbs. per annum, while the balance of our requirements were met by imports from U. K. on a monthly quota basis of about 15,000 lbs. per month.

9. The two raw materials principally required in the manufacture of chloroform are bleaching powder and alcohol. It is reported that under Indian conditions at least 12 cwts. of bleaching powder and about 18 gallons of alcohol are required for the production of 100 lbs. of chloroform. Limited quantities of bleaching powder are being made in India, but they are not enough to supply the country's requirements. As a result, considerable quantities of bleaching powder have to be imported from abroad to meet the requirements of the textile, paper and other industries. In our inquiry into caustic soda and bleaching powder, we estimated that the present production of bleaching powder in India is about 4,000 tons per annum, while the present demand is about 13,600 tons per annum. As regards alcohol, this is now being manufactured in India on a fairly large scale either from molasses where sugar factories exist or from mahua flowers. It should, however, be mentioned that the price of alcohol varies considerably from one province to another, ranging from Rs. 1-8-0 to Rs. 5-8-0 per gallon. It is, therefore, not available to the different consuming industries situated in different parts of India at the same uniform price. We shall revert to this point in a later part of the report.

10. The method employed in India consists of heating together alcohol and bleaching powder in an iron still fitted with a mechanical stirrer and with arrangements for steam heating and water cooling. Crude chloroform gradually distills over, and is collected, purified and redistilled. Calcium chloride is formed as a by product and may be recovered. Apart from this method, there are two other methods employed in other countries, namely, (1) from acetone in place of alcohol and (2) Bcasson's continuous process.

11. Chloroform is used generally as an anaesthetic and occasionally as an antiseptic in the hospitals. For this purpose, it must conform to the B. P. standards of purity. It is also used for industrial purposes as a solvent in many industries, as it readily dissolves, fats, resins, etc. It is also used in the extraction of alkaloids and as an analytical re-agent in the examination of foods and drugs.

12. Calcium chloride, which is formed as a by-product in the manufacture of chloroform, also has many industrial uses. It is used in large quantities as a refrigerating chemical; it is also used in the manufacture of cement fibre boards, for drying coal gas, as a raw material in the manufacture of barium chloride, in the leather industry, and for watering roads in solution to bind down the dust.

13. In view of the fact that chloroform is not entered as a separate item in the Annual Statement of Sea-borne Trade, it was not possible to estimate with any degree of accuracy the quantities imported into India before the war. The position is further complicated by the fact that many chemical works which require chloroform for their own use obtained it by direct imports, and hence no records of their consumption were available with the importing firms. The opinion was expressed that before and during the war the total imports of chloroform into India were of the order of 2,50,000 lbs., out of which some 40,000 lbs. were of the anaesthetic quality required by the hospitals and the balance of the commercial quality required by industry. In view of the fact that it is desirable in the interests of industry to have more reliable data with regard to the import into, and production of this chemical in India, we recommend that it should be entered as a separate item in the Annual Statement of Sea-borne Trade and in the Statistics of Production.

14. From the evidence placed before us at the public inquiry, we estimate that the demand for this chemical during the next 2 to 3 years will be at least as much as in the pre-war years and may be even more, i.e., it will not be less than 2,50,000 lbs. per annum and may possibly be 3,00,000 lbs. per annum. We were informed by the physicians present at the inquiry that the consumption of chloroform in the hospitals is about one pound per patient per annum, but that as a result of the latest developments in medical science, the use of chloroform as anaesthetic is on the decrease. According to the Bhorc Committee's Report, the total number of beds in the Indian hospitals is about 74,000. We may, therefore, conclude that in the next 2 to 3 years the requirements of the anaesthetic variety for the hospitals will be of the order of 50 to 70 thousand lbs. per annum, while the demand for the commercial variety for industrial purposes will be over 2,00,000 lbs. per annum. It is quite likely that with the development of industries in India, the demand for the commercial variety may go up, and therefore decrease in the anaesthetic variety may be offset by an increase in the consumption of the commercial variety.

15. The Industries and Supplies Department of the Government of India had furnished us information regarding the rated capacity of the different units in India. This, together with the information supplied by the manufacturers regarding their productive capacity and actual production, may be summarised as under :—

| Name and address of the factory. | Location. | Date of commencement of production. | Annual production capacity as given by the I. & S. Department. | Actual production from Sept. '44 to Aug. '45. |
|---|--------------------------------------|-------------------------------------|--|---|
| Bengal Chemical & Pharmaceutical Works Ltd., Calcutta. | 164 Manicktola, Main Road, Calcutta. | 1939 | Lbs. | |
| | | | *35,000 | 11,926 lbs. |
| | | | | Actual production in : |
| | | | | Lbs. |
| | | | | 1943 10,504 |
| Bharat Laboratory & Chemical Works, Calcutta. | Calcutta | .. | 1,000 | Not known. |
| | | | 12,000 | Not known. |
| | | | 122,000 | Not known. |
| Eastern Drug Co., Ltd., Calcutta. | Do. | .. | 60,000 | |
| Mettur Chemicals, Mettur Dam | Mettur Dam | .. | | |

* According to Messrs. Bengal Chemical & Pharmaceutical Works Ltd., their maximum capacity is 30,000 lbs.

16. On further enquiries being made, it was found that at present only the Bengal Chemical and Pharmaceutical Works Ltd., Calcutta, were engaged in the manufacture of chloroform. Even in the case of the Bengal Chemical & Pharmaceutical Works Ltd., although their rated capacity was given by them as 30,000 lbs. per annum, yet on the basis of an actual test carried out by them for 23 days and also on the basis of their peak production in 1944 when they manufactured over 15,000 lbs. in less than 9 months, their productive capacity cannot be regarded as being more than 24,000 lbs. per annum. It would, therefore, appear that the productive capacity installed at present for the manufacture of chloroform does not satisfy even 10 per cent. of the total requirements of the country. It should be noted, in this connection, that the Bengal Chemical and Pharmaceutical Works Ltd., manufacture only the B. P. quality, which is required for use in the hospitals, though, in order to manufacture it, they have first to prepare the commercial quality.

17. The product manufactured by the Bengal Chemical & Pharmaceutical Works Ltd., conforms to the B. P. standards, and the physicians present at the inquiry testified that it came up to the required standards of purity. The complaint was made that on some occasions their chloroform, though originally up

to the standard, had deteriorated on storage. It was, however, pointed out that if chloroform is not properly stored or if it is exposed to light, it is likely to deteriorate even though originally it may conform to the highest standards of purity. Furthermore, during the war, some difficulty had been experienced in getting the right type of stoppers, but this difficulty, which relates only to chloroform used for anaesthetic purposes, does not exist now. We may, therefore, conclude that the chloroform manufactured in India satisfies the required standard of purity.

18. Under the present Customs Tariff (First Schedule), the duty levied on Existing duty. chloroform is as follows :—

| Item No. | Name of article. | Nature of duty. | Standard rate of duty. | Preferential rate of duty if the article is the produce or manufacture of. | | |
|----------|---|-----------------------|--------------------------|--|--------------------------|--------------------------|
| | | | | The United Kingdom. | A British colony. | Burma. |
| 28 | Chemicals, Drugs, and Medicines, all sorts not otherwise specified. | Preferential revenue. | 30 per cent. ad valorem. | 24 per cent. ad valorem. | 24 per cent. ad valorem. | 12 per cent. ad valorem. |

19. As mentioned above, chloroform is available in two qualities, namely C.i.f. and landed cost. (a) commercial quality, which is imported in bulk in large containers and (b) pharmaceutical (B.P.) quality, which is used for anaesthetic and antiseptic purposes and comes in one pound bottles. It is important to bear this distinction in mind as the commercial quality is always much cheaper not only because it is less pure, but also because of the cost of the bottles. The landed cost and the selling price of chloroform of B. P. quality imported from England in 1938 was stated to be Rs. 1-13-10 and Rs. 2-5-4 respectively. It was, however, pointed out that at that time importers from Germany were selling the same quality of chloroform at a much lower price. The present c.i.f. price, landed cost and selling price of the commercial and P. B. qualities of chloroform, as given by three importing firms, are as follows :—

| | 1st Firm (July '46) Commercial quality. | 2nd Firm (August '46) B. P. quality. | 3rd Firm (1946) B. P. quality. |
|--------------------------|--|--|--------------------------------------|
| | Rs. a. p. | Rs. a. p. | Rs. a. p. |
| C.i.f. price | 1 4 5 | 1 15 0 | 1 15 8 |
| Customs Duty | 0 4 10 | 0 7 6 | 0 8 8 |
| Clearing charges | 0 0 1 | 0 4 0 | 0 1 0 |
| | 1 9 4 | 2 10 6 | 2 9 4 |
| Selling price | 1 11 7 | 3 5 0 | 4 12 0 |

accept the cost of production of Rs. 3-4-4 per lb. for the next few years. We are of the opinion that if this industry seeks protection or assistance from the State, the cost of production should be based upon a fairly large production extended over a period which can be regarded as representative, and that the accounts should be maintained in such a way that it would be easily possible to construct cost sheet in which the different heads of expenditure, including overheads, profit on fixed capital and interest on working capital are clearly shown and can be properly checked.

21. A comparison of the latest c. i. f. prices and the cost of production quoted by the Bengal Chemical and Pharmaceutical Works, Ltd., Calcutta, shows that if this industry were to be protected, it would require a protective duty of at least 60 per cent. to equalise the landed cost with the cost of production in India. The representative of the Bengal Chemical and Pharmaceutical Works, Ltd., urged at the public inquiry that a protective duty of this magnitude should be imposed in order to enable the local product to compete with the foreign imports. We are, however, unable to accept this request for the following reasons :

(i) One of the two raw materials, which are principally required in the manufacture of this chemical, namely bleaching powder, is not yet made in sufficiently large quantities in India. It has to be imported from abroad in order to meet the requirements of our industries, such as textile and paper. If the manufacture of chloroform is undertaken on a large scale in India, still larger quantities of bleaching powder will have to be imported from abroad until such time as India becomes self-sufficient in this respect. Furthermore, the present indications are that the manufacture of bleaching powder is more costly in India than in the foreign countries and may even require State assistance for a short period. The manufacture of chloroform, therefore, does not enjoy the natural advantage of having its raw materials available in the country at competitive prices.

(ii) The installed capacity in the country is hardly sufficient to meet even 10 per cent. of the total demand in the country. If a high protective duty of 60 per cent. is imposed in order to stimulate the manufacture of the limited quantity required for anaesthetic purposes, it would impose an unduly high burden on the users of the commercial quality, who constitute the bulk of the consumers and who will have to pay a much higher price than at present to meet their requirements. In view of the fact that the commercial quality is required by a large number of industries and in view of the fact that it is desirable that these industries should obtain their raw materials as cheaply as possible, we do not think it proper that a heavy duty should be imposed on this article with a view to encouraging the manufacture of the anaesthetic quality at the expense of the consumers of the commercial quality.

22. We considered the advisability of imposing an adequate protective duty on the anaesthetic quality leaving the commercial quality under a normal revenue duty, but we found that this step was not practical for the following reason. The anaesthetic and the commercial qualities are chemically the

It will be seen that so far as the commercial quality is concerned, its landed cost is Rs. 1-9-4. This was confirmed by the representative of another firm of importers, who was present at the inquiry and whose quotation from U. S. A. agreed fairly well with the price given by the first firm. So far as the B. P. quality is concerned, the landed cost as given by both the firms is about Rs. 2-10-0 per lb., though the selling price is somewhat different. Since the Bengal Chemical & Pharmaceutical Works Ltd., manufacture only the B. P. quality, we have to compare their cost of manufacture with the landed cost of the B. P. quality as given by the two importing firms. It should, however, be mentioned in this connection that it is possible to prepare the B. P. quality from the commercial quality by re-distillation and refinement and to market it after packing it in one pound bottles. It is not possible for us to give the cost of converting the commercial quality into the B. P. quality, as no reliable data was placed before us on this point.

20. In their reply to our questionnaire the Bengal Chemical and Pharmaceutical Works, Ltd., Calcutta, had given the following costs of manufacture for the three years 1943-45 which were based upon their actual production of the quantities mentioned against each year. They had also indicated their estimated cost for the future.

| Estimated cost of production. | | | | Quantity produced. | Cost of production per lb. |
|-------------------------------|----|----|----|--------------------|----------------------------|
| | | | | lbs. | Rs. a. p. |
| 1943 | .. | .. | .. | 10,504 | 2 12 0 |
| 1944 | .. | .. | .. | 15,294 | 3 2 3 |
| 1945 | .. | .. | .. | 4,204 | 2 14 0 |
| Future | .. | .. | .. | .. | 2 11 0 |

Subsequently, they had carried out a test lasting for 23 days in which 479 lbs. of chloroform were produced, and on the basis of this test, they arrived at a figure of Rs. 3-4-4 as their cost of production of one pound of chloroform for the future (*vide* appendix III). In view of the fact that this test lasted for 23 days only when the actual quantity produced was less than 500 lbs. and also in view of the fact that the cost of production arrived at on the basis of this test exceeded their own estimated cost by 8 annas per lb., we were unable to accept the figure of Rs. 3-4-4 per lb. as being completely reliable. We felt that sufficient data was not available to draw definite conclusions as regards the cost of production of chloroform for the next 2 to 3 years. The difficulty in arriving at a reliable cost of production of chloroform was enhanced by the following factors. Chloroform is one of the many items manufactured by the Bengal Chemical and Pharmaceutical Works, Ltd., the other items covering a wide range of chemicals and toilet articles. Separate accounts are not maintained for these items, and it was extremely difficult for our Cost Accounts Officer to allocate the different items of expenditure and overheads to any one item such as chloroform. The indirect allocation of the different heads of expenditure to chloroform was not very helpful as the total capital invested for this particular item is very small and the profits earned on some of the other items are much larger than would ordinarily be allowed by the Board. In view of these difficulties, it was not possible to construct a cost sheet for chloroform, while for the reasons explained above, it was not possible for us to

same substance, and it is possible to manufacture the former from the latter by the simple process of redistribution and refinement. If the commercial quality were allowed to be imported in the interests of its consuming industries under a normal revenue duty, while a heavy protective duty was imposed upon the anaesthetic quality, apart from the administrative difficulties involved in assessing these different duties, it would be possible for any manufacturer in India to import the commercial quality and prepare from it the anaesthetic quality by refining it. If the manufacture of the anaesthetic quality is to be carried on from the imported commercial quality, then it will not be worth while to protect the anaesthetic quality.

23. We were also asked to consider, as an alternative to a protective duty, the possibility of assisting the indigenous industry by giving a subsidy to the manufacturers which would be equal to the difference in the price of bleaching powder in India and England. We were informed that the British manufacturers of chloroform were able to get their bleaching powder at about 11 sh. per cwt., which is equal to about Rs. 7-8-0 per cwt., while the Indian manufacturers had to pay about Rs. 13-8-0 per cwt. for it. Thus, the Indian manufacturers of chloroform were at a disadvantage as compared with the British manufacturers in respect of the price they paid for bleaching powder, and it was suggested to us that if this price difference could be neutralised by the grant of a subsidy equal to the difference between the price of bleaching powder in the two countries, the Indian manufacturers would be able to compete with the British manufacturers. We have carefully examined this suggestion, but find ourselves unable to accept it for the following reasons. As stated above, the quantity of bleaching powder manufactured in India at present is far short of her requirements, and it is likely that for some years to come we will have to import a substantial part of our requirements of bleaching powder from abroad. Furthermore, the present indications are that the cost of manufacture of bleaching powder in India is somewhat higher than in England, and consequently if the bleaching powder industry is to be established in India, it may have to be given some form of protection or assistance by the State. It is difficult to foresee at present how long it will take India to become firstly self-sufficient in the matter of her supplies of bleaching powder and secondly when the bleaching powder manufactured in India will be able to compete with foreign imports without any State assistance. The manufacture of chloroform in India should follow in the wake of a well-established bleaching powder industry. In our opinion, therefore, it is premature to think of granting a subsidy to the chloroform industry.

24. After taking all these factors into consideration, we have come to the conclusion that as conditions exist at present, no case has been made out for any measure of protection or assistance to the manufacture of chloroform in India. If the industry is able to produce costs of manufacture based upon a fairly large production and if these costs are prepared in such a way that the different items of expenditure are based upon actuals and not allocated in an indirect manner so that they can be checked, it would be open for the industry to renew its application for protection.

PART II.—POTASSIUM PERMANGANATE.

25. Potassium Permanganate was not manufactured in India until 1939-40, the total consumption previous to this period being met from imports. During the war this article was in such short supply in the United Kingdom, that for the defence requirements of India not more than 10 to 12 cwts. per annum could be spared in 1941-43, while the demand rose to several hundred tons. Accordingly, it became imperative to establish centres of production in India, and according to the information supplied by the Industries and Supplies Department of the Government of India, the productive capacity of several firms, which started manufacturing this chemical, rose to 60 tons in 1943-44 and nearly 160 tons in 1944-45.

26. The two important raw materials required in the manufacture of this chemical are: (a) pyrolusite ore, which contains from 80 to 82 per cent. manganese dioxide, and (b) caustic potash. Of these, the former is found in abundance in India, which in fact is one of the great sources of supply for the world. The latter, however, is not yet manufactured in India on any large scale, and must therefore be imported from abroad. It is stated that under Indian conditions 21 cwts. of pyrolusite and 19 cwts. of caustic potash are required for the manufacture of one ton of potassium permanganate. Caustic potash may, however, be locally prepared either by treating potassium nitrate, which is found abundantly in certain parts of India with wood charcoal and lime, or from wood ash, which contains potassium carbonate, by treating it with sodium hydroxide.

27. Potassium permanganate is manufactured in India by the following Process of manufacture. three methods:—

(a) *From pyrolusite and caustic potash.*—Requisite quantities of pyrolusite powder and caustic potash are thoroughly mixed and oxidised in the presence of excess of air in furnace heated by coal. The oxidised mass is leached and allowed to settle. The clear liquid is taken to an electric cell where it is further oxidised to permanganate. The permanganate liquor is poured into vessels in which crystals separate out, which are again subjected to further refinement and drying.

(b) *From pyrolusite and potassium nitrate.*—Potassium nitrate is burnt with charcoal to produce potassium carbonate. The crude potassium carbonate is extracted in water and treated with lime to yield caustic potash. This is then reacted with powdered pyrolusite ore and the potassium manganate thus formed is treated with carbon dioxide gas to give potassium permanganate which is crystallised.

(c) *From pyrolusite and wood ash.*—Wood ash, which contains potassium carbonate, is fused with sodium hydroxide and the mixture, when treated with pyrolusite and potassium nitrate, gives potassium manganate. The manganate is converted into permanganate by passing carbon dioxide or chloride into it.

28. Potassium permanganate is an important chemical which is used as an oxidising agent in the manufacture of various fine chemicals, dye-stuffs, pharmaceuticals, synthetic drugs and saccharine, and in nickel refining. It is also used in fairly large quantities for sanitation purposes, as a deodorant and a disinfectant. It is also used as a bleaching agent and as a raw material for several organic compounds such as hydroquinone. It is reported that the Germans used it as a catalytic agent in one of their rockets.

29. In view of the fact that this chemical is not shown as a separate item in the Statement of Sea-Borne Trade, it was not possible to ascertain the exact quantities imported into India before the war. According to the Department of Industries and Supplies, Government of India, the prewar annual imports of potassium permanganate might be taken at 100/150 tons, while, according to a leading firm of importers, the annual imports were about 240 tons, made up as follows :—

| | Tons |
|---|------|
| Disinfectants, preservatives, purification of water, etc. | 160 |
| Special photographic process and tanning | 80 |

30. The consumption of this article in the hospitals is rather small. It was stated that in the two large Bombay hospitals, namely the J. J. Hospitals and the K. E. M. Hospital, the annual consumption was only 12 lbs. and 2 lbs. respectively. However, its demand for public health purposes by the local bodies and municipalities is much larger, though it is subject to considerable variation according to whether or not an epidemic is raging in any part of the country. It was stated that in normal years the consumption for public health purposes by the Bombay Government alone is 5 tons which does not include the demand by the local bodies and municipalities. In an exceptional year in which either a large congregation of people may take place or an epidemic may rage, the demand may increase several times. Taking all the factors into account, it is estimated that the annual demand for this chemical for health as well as industrial purposes is about 200 tons.

31. It is stated above that during the war the productive capacity for this chemical was stepped up to nearly 160 tons per annum but the actual production in any year was considerably below this figure. The Department of Industries and Supplies, Government of India, had kindly furnished information regarding the rated capacity

of the different units, which together with the information supplied by the manufacturers is summarised below :—

| | Annual production capacity | | Actual annual production as given by the producers. |
|--|----------------------------|---|---|
| | As given by I & S. Deptt. | As declared by producers. | |
| | Tons. | Tons. | Tons. |
| 1. Bengal Chemical and Pharmaceutical Works, Ltd., Calcutta. | 100 | 18 in '47 — 30 tons in future—150 tons | in '43 —11.50 in '44—13.65 in '45— 8.40 |
| 2. Indian Chemical, Manufacturers, Ltd. Lahore. | 20 | 40 no work at present for breakdown of C ₂ plant. | in '43/44—3.51 in '44/45—4.50 in '45/46— 6.75 |
| 3. Chemicals, Ltd., Nidadavolu, West Godavari Distt. M. & S. M. Rlo. same as Vijayanam Industries .. | 30 | 40 | in '44/45—4.75 |
| 4. Gandhi Chemical Industries, Bombay | 6 | Not known .. | Not known. |
| 5. Mohd. Allah Baksh | 5 | Do. | Do. |
| 6. *Oriental Chemical Works, Bombay and Chemical Laboratories, Bombay | *10 | 6 | in '44/45—4.01 |
| Total annual productive capacity in India | 171 tons | .. | .. |

So far as the Bengal Chemical and Pharmaceutical Works, Ltd., who are one of the principal manufacturers, are concerned, it may be stated that their present installed capacity is 24 tons per annum. They have, however, placed orders for a bigger plant which they expect will go into operation in about eighteen months, and which is stated to have a productive capacity of 150 tons per annum.

32. According to the evidence given by the physicians present at the public inquiry, the quality of the indigenous product is quite satisfactory. The opinion was, however, expressed that the local manufacturers have not yet been able to prepare crystals of the same uniformity and size as imported from abroad and that this factor produces a certain amount of prejudice against the local product. There is thus room for improvement so far as appearance is concerned and the Indian manufacturers present at the inquiry assured us that every effort would be made to improve the appearance of the indigenous product.

33. The existing rate of customs duty on potassium permanganate is as follows :—

| Name of article. | Nature of duty. | Standard rate of duty. | Preferential rate of duty if the article is the produce or manufacture of | | |
|--------------------------------|-----------------|--------------------------|---|-------------------|--------|
| | | | The United Kingdom. | A British Colony. | Burma. |
| 28 (8) Potassium permanganate. | Revenue | 30 per cent. ad valorem. | .. | .. | .. |

34. Before the war, the landed cost of B. P. quality of potassium permanganate including duty imported from England was about Rs. 65 per cwt. There were, however, some consignments from the continent of which the landed cost inclusive of duty was Rs. 49-6-0 per cwt. The present c. i. f. prices, landed costs and selling prices, as supplied by three importing firms, are given below :

| | 1st firm Tech. grade. | 2nd firm B. P. grade. | 3rd firm | |
|--------------------------|-----------------------------|-----------------------------|----------------------|-----------------------|
| | | | B. P. grade. | Tech. grade. |
| C. I. F. price | Rs. a. p. 152 10 10 | Rs. a. p. 137 2 1 | Rs. a. p. 149 5 4 | Rs. a. p. 127 12 0 |
| Duty | 20 15 11 | 41 8 0 | 52 4 3 | 44 11 5 |
| Clearing charges | 3 5 11 | 2 11 10 | 3 11 9 | 3 3 1 |
| Landed cost | 176 0 7 | 181 6 0 | 205 5 4 | 175 10 6 |
| Selling price | 211 12 6 | .. | 224 0 0 | 189 0 0 |

It will be seen from the above that while according to one firm the landed cost of B. P. grade is Rs. 181-6-0 per cwt., according to another firm it is Rs. 205-5-4 per cwt. On the other hand, the landed cost of the technical grade of the product according to the first and third firms is about Rs. 176 per cwt. The Indian manufacturers stated that their products were made in accordance with the B. P. standards of purity, but since it is possible that the Indian product may be offered competition by the technical grade imported from abroad, and there would be administrative difficulties in distinguishing between the two grades, it is desirable that we should take the lowest landed cost of the technical grade into consideration for evaluating the duty necessary to protect the Indian industry. This, as shown in the table above, is Rs. 175-10-6 per cwt.

35. The Bengal Chemical and Pharmaceutical Works were costed by the Estimated cost of production. Cost Accounts Officer deputed by the Board for the purpose of ascertaining their cost of production of potassium permanganate. The firm's estimate of cost production of potassium

Board's estimate of the cost of production of potassium permanganate from pyrolusite and caustic potash.

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material (1,097-3-0 p
l (R. 34,000).

of production :

(1) This cost has been calculated on the basis of production of 24 tons per annum. As stated earlier, Bengal Chemical & Pharmaceutical Works, Ltd., have already placed an order for a bigger plant having a productive capacity of 150 tons per annum. It was estimated by our Cost Accounts Officer that with the bigger plant the cost of production should come down to about Rs. 118 per cwt. This, however, is somewhat in the nature of guess work as the real costs can only be ascertained after the plant has been in operation for some time.

(2) Even with the present plant it was noticed there is some wastage of steam and that the yield of permanganate from the given quantities of pyrolusite and potash is rather low. The attention of the firm was drawn to these two factors, and they have agreed that the yield should be increased. They stated that with the new rectifiers, one of which has already been installed while three others are on order, the yield is bound to go up. When these improvements are carried out, there should be some reduction in the cost of production even with the present plant.

38. On a comparison of the fair selling price as arrived above and the lowest landed cost as given by the importers, it will be seen that the present revenue duty gives adequate protection to this industry. The manufacturers' representatives agreed with this point of view. They, however, requested that, in order to stabilise the industry, the present revenue duty should be converted into a protective duty and that they should be given a rebate of duty on the potash used by them which would place them on equal grounds with the foreign manufacturers. Caustic potash is not produced in the country, and it is subject to a revenue duty of 30% ad valorem. It was, however, stated at the public inquiry that as a result of the throwing open of imports of caustic potash from the U.S.A., this chemical will be available at the Indian ports at about Rs. 44 per cwt. as against the present price of about Rs. 51 per cwt. and that this decrease of Rs. 7 per cwt. in its price should bring about a reduction in the cost of production of potassium permanganate. It is noted that even with the present price of caustic potash at Rs. 51 per cwt., the Indian manufacturer can compete with the foreign imports, while he will be in a more favourable position to do so when he obtains his supplies of caustic potash at a lower rate. In view of these reasons, we are unable to accept the request that the manufacturers of potassium permanganate should be given a rebate of revenue duty on the caustic potash used by them. We, however, accept their request for converting the present revenue duty into a protective duty and recommend that a protective duty of 30 per cent. ad valorem should be imposed on all imports of potassium permanganate from abroad and that this duty should remain in force for a period of 2 years up to 31st March 1949. We have recommended the imposition of this protective duty for a period of 2 years in view of the information given by the Bengal Chemical and Pharmaceutical Works, Ltd., that their new plant with a capacity of 150 tons per annum will be installed and will be in operation before that date and we feel that after the new plant is installed, the matter should be reinvestigated in order to determine whether any further protection is necessary. We also recommend that if during the next two years ending 31st March 1949 the

landed cost of potassium permanganate goes down below Rs. 156 per cwt., action should be taken by Government under section 4(1) of the Indian Tariff Act to raise the duty so as to equate the landed cost with the fair selling price as estimated by us.

39. Potassium permanganate is used as a deodorant and disinfectant in the interest of public health and is also employed as a raw material in many chemical and pharmaceutical industries. It is, therefore, desirable in the interest of public health and industrial development that it should be available to the consumers at as low a price as possible. Since we have not recommended any increase in the existing duty, the question of any additional burden as a result of our recommendations does not arise, unless the duty has to be raised under section 4 of the Tariff Act because of a fall in the c.i.f. price. We are hopeful that when the bigger plant is installed, this chemical will be available to the public and the consuming industries at a lower cost than at present.

PART III. ETHER SULPHURIC P.B. AND ANAESTHETIC.

40. There was no production of ether in India before 1937, the country's demand being met entirely from imports. The **History of the industry.** Bengal Chemical & Pharmaceutical Works started manufacturing ether in 1937, while the Alembic Chemical Works commenced its manufacture in the following year. These two firms still remain the biggest manufacturers of ether in India, though during the war, owing to the larger demand which existed at that time, two other firms, namely Lister Antiseptics and Dressing Co. Ltd., Calcutta and Leaseo Chemical Works Ltd., Cawnpore, also installed small plants for the manufacture of this chemical. Their actual output, however, has been small.

41. The most important raw material required in the manufacture of ether sulphuric is alcohol. In fact the economic production of ether depends upon the price of alcohol prevailing in the market. The yield of ether from alcohol varies somewhat depending upon the atmospheric temperature, being a little higher in a cooler than in a warmer climate. The pre-war price of alcohol in India was 12 to 14 annas per gallon, but it has now risen very considerably, ranging from Rs. 1-8-0 per gallon to Rs. 5-8-0 per gallon in the different provinces. The other chemicals required in the manufacture of ether are sulphuric acid, caustic soda, potassium permanganate and calcium chloride which are available in the country. The quantities of these chemicals required in the manufacture of ether, however, are relatively small.

42. Ether is produced by heating a mixture of concentrated sulphuric acid and alcohol, the inflow of alcohol being maintained at such a rate that the volume of the mixture remains unchanged and continuous ebullition proceeds smoothly without any break. The **Process of manufacture** ether vapour, together with water and traces of acid vapour, is led through a caustic soda bubbler into a rectifying column from which it passes through a purifying tower and enters the condensers in which ice-cold water is allowed to circulate. The condensed liquid is led into storage tanks. This is ether sul-

phuric P.B. or pharmaceutical ether. During the formation of ether, side reactions also take place, producing sulphonic acid and esters which are sometimes found in the commercial variety. These products of side reactions may, however, be removed by further purification.

43. The pharmaceutical ether is treated with solutions of caustic soda, caustic potash and potassium permanganate to remove aldehydes and peroxide completely. The liquid is then treated with some stabiliser such as alpha-naphthol and put into special containers. This is the anaesthetic ether. One gallon of alcohol should normally give about 4.5 lbs. of pharmaceutical ether or about 2.5 lbs. of anaesthetic ether, though in actual practice the yield may be somewhat less. Sulphuric acid, which is continuously regenerated in the process, becomes gradually diluted with water and has to be brought back to its initial strength by the addition of fresh quantities of concentrated acid.

44. As a solvent, ether is used on a large scale in the preparation of collo-dion, Chardonnet silk and certain explosives containing nitrates of cellulose. It is also used for dissolving fats and resins. The B.P. quality is also used in many pharmaceutical preparations. Ether anaesthetic is used in hospitals for anaesthetic purposes.

45. Since ether is not entered as a separate item in the Statement of Sea-Borne Trade, no reliable figures are available in regard to its imports. It is, however, estimated by the Industries & Supplies Department, Government of India that during the pre-war years imports of the B.P. quality averaged about 55 tons or 123,000 lbs. while that of the anaesthetic quality averaged about 15 tons or 33,500 lb. per annum. It should be mentioned here that the anaesthetic quality is always imported in one lb. bottles, while the B.P. quality may be imported either in small bottles weighing one lb. or in drums weighing from 28 lbs. to 112 lbs. The reason for importing the B.P. quality in two different types of containers is that while the large industrial concerns, which use ether for industrial purposes or for pharmaceutical preparations, purchase it in drums to save the cost of containers as well as freight, the small dispensaries, who use it for dispensing purposes, often buy it in one lb. bottles.

46. In the absence of any reliable import figures, it is difficult to give an indication of the probable demand in the near future. The Industries & Supplies Department, Government of India, estimate that in the next two or three years 50,000 lbs. of ether anaesthetic and 2,50,000 lbs. of ether B.P. will be consumed per annum in the country. This estimate was generally agreed to by those present at the public inquiry. The doctors present at the inquiry stated that so far as ether anaesthetic is concerned, the average consumption in the hospitals is about 2 lbs. per patient per annum. According to this estimate and the number of beds given in the Bore Committee's report, the total hospital requirement of the anaesthetic variety should be about 130,000 lbs. per annum, which is rather in excess of the estimate made by the Industries & Supplies Department. Taking an average of the two figures, we may assume that the demand in the near future of the anaesthetic variety will be about 90,000 lbs. per annum, while that of the B.P. variety

will be about 250,000 lbs. per annum, the total quantity required being 340,000 lbs. per annum. As in the case of chloroform, the hospital demand may decrease owing to the present trend in medical science, but this may be offset by an increase in the consumption of ether B.P. for industrial and Pharmaceutical purposes.

47. The Department of Industries and Supplies, Government of India, had kindly furnished us with information regarding the rated capacity of the different units in India. This together with the information supplied by the manufacturers regarding their productive capacity and actual production may be summarised as under:—

List of manufacturers with their rated capacity and actual production.

| Name of the producer. | Annual productive capacity | | | | Actual annual production in 1944-45 | |
|--|----------------------------|-------------|--------------------------|-------------|-------------------------------------|-------------|
| | As given by I. & S. Deptt. | | As declared by producers | | P.B. | Anaesthetic |
| | P.B. | Anaesthetic | P.B. | Anaesthetic | | |
| | lbs. | lbs. | lbs. | lbs. | lbs. | lbs. |
| 1. Bengal Chemical and Pharmaceutical Works Ltd., Calcutta | 60,000 | 1,44,000 | 1,80,000 (total) | | 31,517 (total) | 7,844 |
| 2. Lister Antiseptics and Dressing Co., Ltd., Calcutta .. | 3,000 | 3,000 | 14,400 .. | | 342 | 127 |
| 3. Alembic Chemical Works, Baroda .. | 1,00,000 | 10,000 | 2,79,000 or 1,80,000 | | 28,921 | 200 |
| 4. Leasco Chemical Works Ltd., Cawnpore | 10,000 | 10,000 | | | .. | .. |
| Total annual production capacity in India | 1,73,000 | 2,57,000 | | | | |

Actual annual production of Bengal Chemical & Pharmaceutical Works and Alembic Chemical Works, in the three years 1943, 1944 and 1945, is as follows:

| | 1943 | 1944 | 1945 |
|--|----------|---------|--------|
| | lbs. | lbs. | lbs. |
| Bengal Chemical & Pharmaceutical Works | 40,631 | 44,021 | 6,880 |
| Alembic Chemical Works, Baroda | 90,851 | 103,392 | 14,566 |
| | 1,31,282 | 148,312 | 27,746 |

This statement was examined at the public inquiry and we were informed that the installed capacity of the Bengal Chemical and Pharmaceutical Works' plant is 180,000 lbs. while that of the Alembic Chemical Works is 270,000 lbs. These relate to the continuous working of the plants for 24 hours for 300 days in the year, and the quantities given above are for the production of the B.P. quality. Approximately one-third of the output in each case can be converted into the anaesthetic variety if required. No information was forth-coming as to whether the other two firms are still in production of ether. We may, therefore, conclude that the total productive capacity at present installed in the country for the manufacture of ether sulphuric P.B. and other anaesthetic is as follows :

Bengal Chemical and Pharmaceutical Works, Ltd.

| | | | | | | | | Lbs. |
|-------------------|----|----|----|----|----|----|----|----------|
| Ether P. B. | .. | .. | .. | .. | .. | .. | .. | 1,20,000 |
| Ether anaesthetic | .. | .. | .. | .. | .. | .. | .. | 60,000 |
| Total | | | | | | | | 1,80,000 |

Alembic Chemical Works, Ltd.

| | | | | | | | | Lbs. |
|-------------------|----|----|----|----|----|----|----|----------|
| Ether P. B. | .. | .. | .. | .. | .. | .. | .. | 1,80,000 |
| Ether Anaesthetic | .. | .. | .. | .. | .. | .. | .. | 90,000 |
| Total | | | | | | | | 2,70,000 |

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It will thus be seen that the productive capacity installed in the country is enough to meet the country's estimated requirements of both varieties during the next few years.

48. The quality of the B.P. product, which has been used for industrial purposes and in laboratories, was stated at the public inquiry to be quite satisfactory. Similarly, the quality of the anaesthetic variety was also stated to be quite satisfactory by the doctors present at this inquiry. They, however, mentioned that they would prefer the anaesthetic ether to be packed in bottle with copper lining, but it was pointed out that this method of packing, besides being expensive, was now unnecessary as stabilisers have been discovered which perform the same function which was previously performed by the copper lining of the container, namely, the prevention of the conversion of ether into peroxides and aldehydes. It was pointed out that the phenolic stabiliser used for this purpose give the same test as peroxides and aldehydes, and, therefore, users should not be alarmed if they get a positive result of this test. To avoid confusion, the test should be performed, under ideal conditions, by first redistilling the ether so as to remove the stabilisers.

Existing Duty.

49. The existing rate of duty is shown below.—

| Item No. | Name of article | Nature of duty | Standard rate of duty | Preferential rate of duty if the article is the produce or manufacture of | | |
|----------|-----------------|-----------------------|-----------------------|---|-----------------|-----------------|
| | | | | U.K. | A Br. Colony | Burma. |
| 28 | Ether .. | Preferential revenue. | 33% ad valorem. | 24% ad valorem. | 24% ad valorem. | 12% ad valorem. |

50. According to the information supplied by the Industries and Supplies Department, Government of India, the pre-war price of imported ether ranged from Rs. 100 to Rs. 112 per cwt. This presumably refers to the pharmaceutical variety, as, according to a firm of importers, the landed cost of the anaesthetic variety was about Rs. 2-0-9 per lb. The present c.i.f. price and landed costs, as given by two firms, are as follows.—

| | 1st firm. | | 2nd firm. | |
|---------------------|-----------|--------------|-----------|--------------|
| | B.P. | Anaesthetic. | B.P. | Anaesthetic. |
| | Rs. a. p. | Rs. a. p. | Rs. a. p. | Rs. a. p. |
| C. I. F. .. | 0 10 7 | 1 12 6 | 2 1 9 | 2 3 7 |
| Customs Duty .. | 0 3 10 | 0 10 0 | 0 8 1 | 0 8 6 |
| Clearing Charges .. | 0 0 2 | 0 1 0 | 0 0 10 | 0 0 10 |
| Landed Cost .. | 0 14 7 | 2 7 6 | 2 10 8 | 2 12 11 |
| Selling Price .. | 1 1 4 | 2 10 10 | 2 14 0 | 3 0 0 |

The reason for the large difference in the prices of the pharmaceutical variety quoted by the two firms is that whereas the first firm imported it in drums, the second firm imported the B.P. quality also in one lb. bottles. Since the Indian manufacturers usually supply the B.P. quality in drums and the anaesthetic quality in bottles, we should take the c.i.f. price of Rs. 0-10-7 for the B.P. quality and about Rs. 2 for the anaesthetic quality for assessing the duty which would be necessary to give adequate protection to the Indian products.

51. The Cost Accounts Officer deputed by the Board was sent both to the **Estimated cost of pro-** Alembic Chemical Works Ltd., and the Bengal Chemical & Pharmaceutical Works Ltd., to examine their books with a view to determining their costs of production of ether sulphuric P.B. and ether anaesthetic. Both these factories manufacture a large number of items besides ether, and the accounts are not maintained separately for the different items. This necessitated an indirect process of allocating expenditure to different heads, and in many cases the allocation was more in the nature of an estimate rather than a figure based upon actual data. The Alembic Chemical Works manufacture their own alcohol, which is the principal raw material required in the production of ether ; but they did not place before our Cost Accounts Officer any data relating to the cost of production of alcohol. In estimating their cost of production of ether, they assumed a price of Rs. 4 per gallon for alcohol, but at the public inquiry, they stated that they would be willing to accept any price fixed by the Board. Furthermore, in the process of manufacture of alcohol, carbon dioxide—a bye-product—is collected and sold by them in the market, but no credit on this account was given in their cost statements. The allocation of overheads was done in an arbitrary way, while the debits recorded on account of steam, power etc., were also on a rough and ready basis without any relationship to the actual quantities used. Their attitude, on the whole, was not at all co-operative, especially in regard to the cost of production of alcohol which was one of the most important items on which information was required by the Board. On all these accounts, the costs submitted by them are not regarded as reliable and were not accepted by us. We must, at this stage, emphasise the fact that it is the duty of all industrial firms, who apply for protection, to place their data unreservedly before the Board and help it in its work and deliberations by offering it full co-operation in the matter of detailed information on the production costs of their items. If such information is not forthcoming or is deliberately withheld, the task of the Board is made extremely difficult. In the light of these observations, the attitude adopted by the Alembic Chemical Works was regrettable indeed. It clearly gave the impression that while they were prepared to take full advantage of any assistance or protection that may be offered to the industry, they were not willing to offer their full co-operation by disclosing their real costs of production.

52. On the basis of the data supplied by the Bengal Chemical & Pharmaceutical Works and after making certain adjustments, the Cost Accounts Officer, deputed by the Board, estimated the cost of production as given in the following table :—

Estimate of the cost of production of ether sulphuric P. B. and ether anaesthetic based on a production of 10,000 lbs. & 20,000 lbs. respectively.

| | Ether sulphuric B.P. | | Ether anaesthetic: | |
|--|------------------------------|----------------------|------------------------------|----------------------|
| | Per 10,000 lbs. in Rs. | per lb. in Rs. | per 20,000 lbs. in Rs. | per lb. in Rs. |
| I Materials— | | | | |
| (a) Spirit 2858 gallons at Rs. 2/8 per gallon | .. | 7,145 | 8,000 gallons | .. |
| (b) Sulphuric acid 20 cwts. at Rs. 154 per ton | .. | 154 | 45 cwt. | .. |
| (c) Ice 187 blocks of 3 mds. each at Rs. 4 per block | .. | 748 | 880 blocks | .. |
| (d) Potassium permanganate 3.751 lbs. at Rs. 2 per lb. | .. | 7.5 | 7.5 lbs. | .. |
| (e) Caustic soda 15 cwts. at Rs. 19/8 per cwt. | .. | 292.5 | 40 cwt. | .. |
| (f) Calcium chloride 3.75 cwt. at Rs. 1 per lb. | .. | 420.0 | .. | .. |
| (f) Potassium iodide 200 lbs. at Rs. 8/9 per lb. | .. | .. | .. | .. |
| (h) Mercuric chloride 47 lbs. at Rs. 20 per lb. | .. | .. | .. | .. |
| (i) Pyrogalllic acid 3.75 lbs. at Rs. 27 per lb. | .. | .. | .. | .. |
| | 8,767.0 | 0.8767 | 27,412.25 | |
| Less recoveries— | | | | |
| I. Sulphuric acid 14 cwt. at Rs. 140 per ton = Rs. 98 | .. | 183.0 | 30 cwts. — Rs. 210 .. | .. |
| II. Caustic soda 8.5 cwts. at Rs. 10 per cwt. = Rs. 85 | .. | | 30 cwts. — Rs. 210 .. | 420.00 |
| | 8,584.0 | 0.8584 | 26,992.25 | 1.3496 |

2 Power and Fuel—

| | | | | | |
|------------------------|----|----|----|--------------------|----|
| (a) Steam Rs. 1,210 | .. | .. | .. | Steam Rs. 2,420 | .. |
| (b) Electricity Rs. 20 | .. | .. | .. | Electricity Rs. 30 | .. |
| (c) Water Rs. 25 | .. | .. | .. | Water Rs. 50 | .. |

3 Labour—

| | | | | | |
|-------------------------|----|----|----|------------------|----|
| (a) Workers Rs. 2,000 | .. | .. | .. | Workers 6,133 | .. |
| (b) Supervision Rs. 200 | .. | .. | .. | Supervisions 550 | .. |

4 Repairs and Maintenance ..

5 Consumable Stores ..

6 Establishment ..

7 Depreciation ..

8 Other overheads ..

9 Packing ..

| | | | | | | | |
|----|----|----|----|---------|--------|-----------|--------|
| .. | .. | .. | .. | 520-0 | 0-0520 | 1,040-00 | 0-0520 |
| .. | .. | .. | .. | 62-0 | 0-0062 | 125-00 | 0-0062 |
| .. | .. | .. | .. | 40-0 | 0-0040 | 115-00 | 0-0057 |
| .. | .. | .. | .. | 245-0 | 0-0245 | 330-00 | 0-0165 |
| .. | .. | .. | .. | 2,125-0 | 0-2125 | 6,758-00 | 0-3379 |
| .. | .. | .. | .. | 1,700-0 | 0-1700 | 11,000-00 | 0-5500 |

16,731-0 1-6731
=Rs. 1-10-9

56,643-25 2-7771
=Rs. 2-13-4.

53. This estimate was examined at the public inquiry, and it was found that the system of keeping accounts, which had been followed by the Bengal Chemical and Pharmaceutical Company, was such that no accurate figures could be assigned to various items such as labour, establishment, overhead, power and fuel, etc. All these allocations had been made by the Company in an indirect manner, and by applying the system of cross-checks it was found that in many cases these figures were assumed rather than based upon actual data. Taking, for example, the case of the pharmaceutical quality for purposes of comparison, it would be seen that while the c.i.f. price of the imported article is Rs. 0-10-7 per lb., the net cost of production at the Bengal Chemical and Pharmaceutical Works, excluding profits, is stated to be Rs. 1-10-9 per lb. This would necessitate a protective duty of about 150 per cent. in order to equate the price of the imported article with the net cost of production.

54. It was represented to us that one reason why the costs of production of ether in India were so high was the relatively high price which the Indian manufacturer had to pay for alcohol as compared with the British manufacturer. It was stated that the British manufacturer would be able to get his alcohol at 1 sh. 10 d. which is equal to about Rs. 1-4-0 per gallon, while the Bengal Chemical and Pharmaceutical Works have to pay Rs. 2-8-0 per gallon. It was, however, pointed out that even if the Indian manufacturer were supplied with alcohol at the same price as the British manufacturer, it would make a difference of only Rs. 0-5-0 in the price of ether B. P. and Rs. 0-8-0 in the price of the anaesthetic quality, thereby reducing the net cost of production of these two varieties to Rs. 1-5-8 for the B. P. and Rs. 2-3-8 for the anaesthetic variety. Even if this handicap of the Indian manufacturer in regard to difference in the price of alcohol were removed a high protective duty amounting to over 100 per cent. would be necessary to enable him to compete with the foreign manufacturer. This fact alone is sufficient to show that the allocation made for such items as power and fuel, repairs and maintenance, establishment, other overheads etc., are much too high, and require to be verified against actual data. In fact, the representative of the Alembic Chemical Works stated at the public inquiry that they allow overheads amounting to 8 annas per lb. which seems an abnormally high figure in view of the fact that the c. i. f. price of the imported ether is only Rs. 0-10-7 per lb. Another factor which seems to have been lost sight of is that normally the overheads should diminish with increasing production, but in this particular case they were assumed at a constant rate per lb. regardless of production. When all these facts were pointed out to the representatives of the industry, they agreed that sufficient data was not yet available to enable the Board to draw any definite conclusions, and requested that the case may be kept open for further inquiry so that in the meantime the industry may be able to collect more reliable data in which the items under the different heads are directly ascertained. They also requested that in order to enable them to work their plant at its full capacity for a sufficiently long period of time, Government may be asked to stop all imports of ether into the country on an assurance given by the manufacturers that they would sell both the B. P. and the anaesthetic qualities at prices quoted at present by the importers. They based this request on the ground that

sufficient productive capacity exists in the country to meet its full requirements and that it should be given a chance to work for about a year so that the industry may be able to ascertain definite costs of production and place them before the Board for a further inquiry. We have carefully considered this proposal, but we cannot see our way to accepting the request made by the industry for the complete stoppage of imports as we feel that both firms concerned in this matter are sufficiently big to undertake the manufacture of ether for the purpose of working out their costs without any serious reduction in their profits. It is quite the normal practice for large industrial concerns to make pioneering efforts to produce new items and to invest certain sums of money in these efforts on which immediate returns may not be available but which are likely to yield good profits in the long run. We suggest that this course should be adopted by the two firms, who are earning fairly large profits on other items, in respect of ether, so that they may be in a position to place before the Board accurate data with regard to their costs of production. We further recommend that in the meantime the case may be kept open for further inquiry which may be made when the industry is ready for it and again approaches Government.

55. In the course of this inquiry it transpired that the position regarding the price of alcohol and the freight charged on it from one province to the other and the excise rates

Price of and freight on alcohol. which govern it is far from satisfactory. Alcohol is used as a raw material or as a solvent in numerous industries which are scattered all over the country, and in our opinion it is essential that it should be supplied to these industries at a fairly uniform price. We were informed that the price of alcohol per gallon is Rs. 1-6-0 in U. P., Rs. 2-8-0 in Bengal, Rs. 4-0-0 in Bombay and Rs. 5-8-0 in Madras, and that there is very little relationship with the price of raw materials used in its manufacture. It was also reported to us that the rate of duty which is levied upon alcohol varies from province to province and that this variation is considerable. It was further reported to us that the freight charged on alcohol for taking it from a surplus to a deficit area is excessive and that the provincial excise rules are not framed so as to help the cause of industrial development in India. We recommend that the Government of India should convene a conference on alcohol as early as possible to suggest ways and means of ensuring that this important raw material is supplied to different factories in India at approximately the same price, that a suitable reduction in freight is made and that the provincial excise rules are modified in the interests of the industry.

PART IV.—SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS.

56. Our conclusions and recommendations may be summarised as under :—

(2) The requirements of the anaesthetic variety for the hospitals are estimated at 50,000 to 70,000 lbs. per annum; while the demand for the commercial variety is estimated to be over 200,000 lbs. per annum (paragraph 14).

(3) The productive capacity of the plants installed in India for the manufacture of chloroform is less than 10 per cent. of the total estimated requirements of the country. (Paragraph 16.)

(4) The chloroform manufactured in India is upto the required standard of purity. (Paragraph 17.)

(5) Since the quantity of bleaching powder, which is one of the essential raw materials of chloroform, is not enough to meet the country's requirements, and its cost of manufacture is likely to be higher than in other countries for some time, the manufacture of chloroform does not enjoy the natural advantage of having its raw materials available in the country at competitive prices. [Paragraph 21 (i).]

(6) If a protective duty is imposed on chloroform to stimulate the manufacture of the anaesthetic variety, it would impose an unduly high burden on the users of the commercial quality, who constitute the bulk of the consumers. [Paragraph 21 (ii).]

(7) From the scientific point of view, the manufacture of chloroform in India should follow in the wake of a well-established bleaching-powder industry. It is, therefore, premature to grant a subsidy to an industry which uses bleaching powder, which has to be imported, as one of its raw material. (Paragraph 23.)

(8) As conditions exist at present, no case has been made out for any measure of protection or assistance to the manufacture of chloroform in India. (Paragraph 24.)

PART II.—POTASSIUM PERMANGANATE.

(9) The estimated annual demand for potassium permanganate, both for public health and industrial purposes, is 200 tons. (Paragraph 30.)

(10) The productive capacity, as at present installed in the country, is 24 tons per annum; with the installation of a bigger plant for which order has been placed by a firm, the productive capacity is expected to be 150 tons per annum. (Paragraph 31.)

(11) The purity of the indigenous product is quite satisfactory, but there is room for improvement so far as its appearance is concerned. (Paragraph 32.)

(12) The lowest landed cost of the imported article at present is Rs. 175-10-6 per cwt., while the fair selling price for the Indian product, on the basis of an annual production of 24 tons, is estimated to be Rs. 156 per cwt. However, with a bigger plant, capable of producing 150 tons per annum, the cost of production should be lower. The present revenue duty of 30 per cent. *ad valorem*, therefore, gives adequate protection to the industry. (Paragraphs 34, 36 and 37.)

(13) The present revenue duty of 30 per cent. *ad valorem* should be converted into a protective duty at the same rate and this protective duty should remain in force for a period of two years upto the 31st March, 1949. (Paragraph 38.)

(14) If, during the next two years ending on 31st March, 1949, the landed cost of potassium permanganate goes down below Rs. 156 per cwt., action should be taken by Government under Section 4 (1) of the Indian Tariff Act to raise the duty so as to equate the landed cost with the fair selling price as estimated by the Board. (Paragraph 38.)

PART III. ETHER SULPHURIC P. B. AND ANAESTHETIC.

(15) The Indian demand in the near future for the anaesthetic variety is estimated to be about 90,000 lbs. per annum, while that for B. P. variety for industrial purposes will be about 2,50,000 lbs. per annum, making a total of 3,40,000 lbs. per annum. (Paragraph 46.)

(16) The plants installed in the country for the manufacture of ether can produce 3,00,000 lbs. of ether P. B. and 1,50,000 lbs. of ether anaesthetic; and this capacity is sufficient to meet the country's estimated requirements of both varieties during the next few years. (Paragraph 47.)

(17) The industry has not been able to produce sufficient data with regard to costs of production from which the Board could draw definite conclusions. Until the industry is in a position to present accurate data with regard to their costs of production in about a year's time, the case should be kept open for further inquiry. (Paragraph 54.)

(18) Government of India should convene a conference of representatives of Provincial and State Governments concerned with a view to suggesting (a) ways and means of ensuring that alcohol, being an important industrial raw material, is supplied to the different factories in India at a uniform price, (b) suitable reduction in freight on alcohol, and (c) modification of the provincial excise rules in the interests of the industry. (Paragraph 55.)

57. We wish to express our thanks to all those who assisted us in this inquiry, particularly to Dr. J. N. Ray of the Department of Industries and Supplies, Government of India, who prepared valuable notes and attended the public inquiry; Mr. S. V. Ayyar, Cost Accounts Officer (Supply Finance Department), who carried out the work of examining the accounts of the companies; Mr. S. D. Sunawala, our Technical Adviser, Rai Sahib Aggarwal, Deputy Secretary, and Dr. Rama Varma, Assistant Secretary, for the help rendered by them throughout the inquiry.

SHANMUKHAM CHETTY—*President.*

NAZIR AHMAD—*Member.*

S. C. AGGARWAL—*Deputy Secretary.*

BOMBAY;

Dated the 1st March, 1947.

APPENDIX I.

List of firms and organisations to whom the detailed questionnaire was issued.

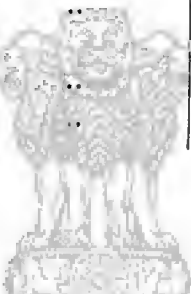
(Vide PARAGRAPH 4.)

| Name of firm or organisation. | Relating to the following industries. | | | |
|--|---------------------------------------|------------|----|--|
| (A) PRODUCERS. | | | | |
| 1. Bengal Chemical & Pharmaceutical Works Ltd., Calcutta. | Potassium perman- ganate. | Chloroform | .. | Ether sulphuric P. B. and Anaesthetic. |
| 2. Chemicals, Ltd., Nidadavolu (M. S. M. Rly.). | Do. | Do. | .. | Do. |
| 3. Indentors' Syndicate, Bombay .. | Do. | .. | .. | .. |
| 4. Chemia Laboratories, Bombay .. | Do. | .. | .. | .. |
| 5. Shambhunath & Sons, Amritsar | Do. | .. | .. | .. |
| 6. Government Dichromate Factory Belagula. | Do. | .. | .. | .. |
| 7. Associated Chemicals, Itwari, Nagpur. | Do. | .. | .. | Chloroform Ether sulphuric P. B. and Anaesthetic |
| 8. Deccan Chemicals and Fertilizers, Hubli. | Do. | .. | .. | .. |
| 9. Kamani Metal Refinery & Metal Industries Ltd., Jaipur. | Do. | .. | .. | Ether sulphuric P. B. and Anaesthetic. |
| 10. Indian Chemical Manufacturers, Ltd., Lahore. | Do. | .. | .. | .. |
| 11. Gandhi Chemical Industries, Bombay. | Do. | .. | .. | .. |
| 12. Oriental Chemical Works, Bombay. | Do. | .. | .. | .. |
| 13. The Alembic Chemical Works Co., Ltd., Baroda. | .. | Chloroform | .. | Ether sulphuric P. B. and Anaesthetic. |
| 14. The Lister Antiseptic & Dressing Co., Ltd., Calcutta. | Potassium Perman- ganate. | Do. | .. | Do. |
| 15. The Mysore Industrial & Testing Laboratory Ltd., Bangalore. | .. | Chloroform | .. | Ether Sulphuric P. B. and Anaesthetic. |
| 16. The Mettur Chemical & Indus- trial Corp., Ltd., Mettur Dam. | .. | Do. | .. | .. |
| 17. Walchand Nagar Industries Ltd., Bombay. | .. | Do. | .. | Ether Sulphuric P. B. and Anaesthetic. |
| 18. The Laseo Chemical Works Ltd., Cawnpore. | .. | Do. | .. | Do. |
| 19. Bharat Laboratory & Chemical Works, Calcutta. | .. | Do. | .. | .. |
| 20. Eastern Drug Co., Calcutta .. | .. | Do. | .. | .. |

APPENDIX I—*contd.*

| Name of firm or organisation. | Relating to the following industries. | | | |
|--|---------------------------------------|------------|----|--|
| (B) IMPORTERS. | | | | |
| 1. Imperial Chemical Industries (India) Ltd., Calcutta. | Potassium Permanganate. | Chloroform | .. | Ether Sulphuric P. B. and Anaesthetic. |
| 2. Kanthawala Nanavathi & Co., Ltd., Bombay. | Do. | .. | .. | .. |
| 3. Volkart Bros., Bombay .. | Do. | .. | .. | .. |
| 4. Boots Pure Drug Co. (India) Ltd., Calcutta. | Do. | Chloroform | .. | Ether Sulphuric P. B. and Anaesthetic. |
| 5. The British Drug Houses Ltd., Bombay. | .. | Do. | .. | Do. |
| 6. R. S. Napper, Calcutta .. | .. | Do. | .. | Do. |
| 7. L. H. Emeny, Bombay .. | .. | Do. | .. | Do. |
| 8. May & Baker (India) Ltd., Bombay. | .. | Do. | .. | Do. |
| 9. Martin & Harris Ltd., Bombay .. | .. | Do. | .. | Do. |
| 10. Smith Stanistreet & Co., Ltd., Calcutta. | .. | Do. | .. | Do. |
| 11. Kusalehand & Co., Calcutta .. | .. | Do. | .. | Do. |
| 12. R. K. Shapurji & Co., Bombay .. | .. | Do. | .. | Do. |
| 13. The Anglo Thai Corporation Ltd., Bombay. | .. | .. | .. | Do. |
| (C) CONSUMERS. | | | | |
| 1. The Bombay Medical Association, Bombay. | Potassium Permanganate. | Chloroform | .. | Ether Sulphuric P. B. and Anaesthetic. |
| 2. The Bombay Medical Union, Bombay. | Do. | Do. | .. | Do. |
| 3. The Royal Institute of Science, Bombay. | Do. | Do. | .. | Do. |
| 4. The Commissioner of Corporation, Calcutta. | Do. | Do. | .. | Do. |
| The Commissioner of Corporation, Bombay. | Do. | Do. | .. | Do. |
| 6. The Director of Public Health, Government of Bombay, Poona. | Do. | .. | .. | .. |
| 7. The Director of Public Health, Government of U.P., Lucknow. | Do. | .. | .. | .. |
| 8. J. J. Group Hospitals, Bombay. | Do. | Chloroform | .. | Ether Sulphuric P. B. and Anaesthetic. |
| 9. K. E. M. Hospital, Bombay .. | Do. | Do. | .. | Do. |
| 10. St. George's Hospital, Bombay | Do. | Do. | .. | Do. |

APPENDIX I—*contd.*

| Name of firm or organisation. | Relating to the following industries. | | |
|--|---|---------------|---------------------------------------|
| 11. Government Medical Stores Depot, Byculla, Bombay.. | Potassium Permanganate. | Chloroform .. | .. |
| 12. The Public Analyst, Lucknow .. | .. | Do. | Ether Sulphuric P. B and Anaesthetic. |
| 13. The Charnichael Medical College Hospital, Calcutta. | .. | Do. | Do. |
| 14. The University Science College, Calcutta. | .. | Do. | Do. |
| 15. Director General, Indian Medical Service, New Delhi. | .. | Do. | Do. |
| 16. Standard Pharmaceutical Works, Ltd., Calcutta. | .. | Do. | Do. |
| 17. The Campbell Hospitals, Calcutta | .. | Do. | Do. |
| 18. Sarabhai Chemicals, Baroda .. | .. | .. | Do. |
| (D) ASSOCIATIONS AND OTHERS. |  | | |
| All Chambers of Commerce .. | | | |
| Directors of Industries, Provincial Governments. | | | |
| Bombay Province Chemical Manufacturers' Association, Bombay. | | | |
| Indian Chemical Manufacturers' Association, Calcutta. | | | |
| The All India Manufacturers' Organization, Bombay. | Potassium Permanganate; Chloroform; Ether Sulphuric B. P. and Anaesthetic. मन्त्रालय जयन्त | | |

APPENDIX II.

(Vide PARAGRAPH 6.)

*List of persons who attended the Public Enquiry on 17th and 18th December, 1946.***PRODUCERS.**

- | | | | |
|----------------------|----|----|--|
| 1. Mr. N. Adhikari | .. | .. | Representing Bengal Chemical and Pharmaceutical Works, Ltd., Calcutta. |
| 2. Mr. I. S. Amin | .. | .. | Representing The Alembic Chemical Works, Ltd., Baroda. |
| 3. Mr. B. H. Krishna | .. | .. | Representing Sarabhai Chemicals, Baroda. |

ASSOCIATIONS.

- | | | | |
|---------------------|----|----|---|
| 1. Dr. L. A. Bhatt, | | | Representing— |
| | | | 1. Indian Chemical Manufacturers' Asscn., Calcutta. |
| | | | 2. The All India Manufacturers' Organisation, Bombay. |
| 2. Mr. Merlin Drake | .. | .. | Representing the Association of British Chemical Manufacturers, London. |

IMPORTERS.

- | | | | |
|---------------------------------------|------|----|---|
| 1. Mr. F. W. Griffin | .. | .. | Representing the British Drug Houses, Ltd. Bombay. |
| 2. Mr. R. S. Napper Mr. H. Barrett | } .. | .. | Representing R. S. Napper, Manufacturers' Representative, Calcutta. |
| 3. Mr. W. Schesinger | .. | .. | Representing The Anglo-Thai Corporation, Ltd., Bombay. |
| 4. Mr. S. S. Sarma | .. | .. | Representing May & Baker (India), Ltd., Bombay. |

CONSUMERS.

- | | | | |
|-------------------------|----|----|---|
| 1. Mr. M. G. Pandit | .. | .. | Representing Dy. A. D. G. (Medical Service), Bombay. |
| 2. Mr. E. Benjamin | .. | .. | Representing The Director of Public Health, Government of Bombay. |
| 3. Prof. R. C. Shah | .. | .. | Representing the Royal Institute of Science, Bombay. |
| 4. Dr. K. K. Badachanji | .. | .. | Representing The Bombay Medical Association, Bombay. |
| 5. Dr. S. G. Talwalkar | | .. | Representing the Bombay Medical Union, Bombay. |
| 6. Capt. V. A. Mauskar | | .. | Representing the Suptd., J. J. Group of Hospitals, Bombay. |
| 7. Mr. V. K. Kale | .. | .. | Representing the Suptd., K. E. M. Hospitals, Bombay. |
| 8. Dr. N. Y. Anagundi | .. | .. | Representing the Superintendent, St. George Hospital, Bombay. |

OFFICIALS.

- | | | | |
|---------------|----|----|--------------------------------------|
| Dr. J. N. Ray | .. | .. | D. G. I. & S. Department, New Delhi. |
|---------------|----|----|--------------------------------------|

APPENDIX III.

(Vide PARAGRAPH 20.)

Revised Estimate of Cost of 479 lbs. of Chloroform (as proposed by Bengal Chemical and Pharmaceutical Works, Ltd., Calcutta).

| | Per 479 lbs. in Rs. | Per lb. in Rs. |
|--|------------------------|-------------------|
| 1. Materials : | | |
| (a) Bleaching powder (I. C. I.) 57.75 cwt. @ Rs. 13/8 per cwt. | 779 10 0 | 2 2 8.1 |
| (b) Spirit (denatured) 88 gallons @ Rs. 2/8 per gallon | 220 0 0 | |
| (c) Ice 8 blocks @ Rs. 3/8 per block | 28 0 0 | |
| (d) Distilled water 14 galls. @ Rs. 4 per gal | 3 8 0 | |
| (e) Sulphuric Acid refined 62 lbs. @ Rs. 0-1-9 per lb. | 6 12 6 | |
| (f) Soda Ash 2 lbs. @ Rs. 0-1-5½ per lb. | 0 2 11 | |
| Less for calcium chloride by-product | 1,038 1 5 | 2 2 8.1 |
| 500 lbs. coml. @ Rs. 0-4-0 per lb. | 125 0 0 | 0 4 2.1 |
| | 913 1 5 | 1 14 6.0 |
| 2. Power and Fuel (Steam and Electricity) | 37 13 6 | 0 1 3.3 |
| 3. Labour 524 man hours @ Rs. 1-6-6 per 8 man hours | 92 1 9 | 0 3 0.9 |
| 4. Repair & Maintenance for 11 charge at Rs. 1/8/- per charge | 16 8 0 | 0 0 6.6 |
| 5. Consumable Stores for 11 charge Rs. 0-2-0 per charge | 1 6 0 | 0 0 0.6 |
| 6. Establishment for 11 charge Rs. 2 per day | 22 0 0 | 0 0 8.8 |
| 7. Depreciation for 11 charge Rs. 2/- per still per charge | 22 0 0 | 0 0 8.8 |
| 8. Other overheads (22% on labour and material Rs. 1,005-3-2) | 221 1 7 | 0 7 4.6 |
| 9. Packing charges @ Rs. 0-8-0 per lb. | 239 0 0 | 0 8 0 |
| Total cost of chloroform | 1,565 8 3 3 | 4 3.5 |

| | | | | Per ton. |
|--|---------------|----|-------|-----------|
| | | | | Rs. a. p. |
| 1. Materials : | | | | |
| (a) Pyrolusite powder 22 cwt. @ Rs. 6/8/- per cwt. | .. | .. | 143 | 0 0 |
| (b) Caustic Potash 20 cwt. @Rs. 50/9/- per cwt. | .. | .. | 1,011 | 4 0 |
| | | | <hr/> | |
| | | | 1,154 | 4 0 |
| 2. Power & Fuel: | | | | |
| (a) Electricity—3,800 units @ 0.55 as. per unit. | .. | .. | 133 | 0 0 |
| (b) Coal—2 tons @ Rs. 20/- per unit | .. | .. | 40 | 0 0 |
| (c) Steam 66,000 lbs. @ 0.8 pias per lb. | .. | .. | 277 | 8 0 |
| 3. Labour : | | | | |
| 21 heads @ Rs. 40 each per month | } Rs. 1,080/- | .. | .. | 540 0 0 |
| 3 " " Rs. 80 " " " " } | for 2 tons. | .. | .. | |
| 4. Repair & Maintenance | .. | .. | 85 | 0 0 |
| 5. Consumable stores | .. | .. | 10 | 0 0 |
| 6. Establishments | .. | .. | 120 | 0 0 |
| 7. Depreciation | .. | .. | 128 | 0 0 |
| 8. Other overheads : | | | | |
| 22% on labour & materials Rs. 1,694/4/0 | .. | .. | 372 | 12 0 |
| 9. Packing @ Rs. 6/- per cwt. | .. | .. | 120 | 0 0 |
| | | | <hr/> | |
| Net cost of production | .. | .. | 2,980 | 8 0 |
| | | | = | 149 0 4.8 |
| | | | | per cwt. |

APPENDIX V.

(Tide PARAGRAPH 36).

Estimate of the cost of production (including profits) of potassium permanganate based on a production of 50 tons per annum, as proposed by Indian Chemical Manufacturers, Ltd., Lahore.

| | Per 50 tons in Rs. | per cwt. in Rs. |
|--|-----------------------|--------------------|
| 1. Materials : | | |
| (a) Manganese Dioxide 40 tons @ Rs. 200/- per ton .. | 8,000 | 8 0 0 |
| (b) Potassium Nitrate 50 tons @ Rs. 800 per ton .. | 40,000 | 40 0 0 |
| (c) Charcoal 20 tons @ Rs. 225/- per ton | 4,450 | 4 7 2 |
| (d) Limestone, 350 tons @ Rs. 25 per ton | 8,750 | 8 12 0 |
| (e) Coke 175 tons @ Rs. 70/- per ton | 12,250 | 12 4 0 |
| 2. Power & Fuel— | | |
| (a) Electricity 5,000 units @ Rs. 0-1-0 per unit .. | 312 8 0 | 0 5 0 |
| (b) Coal 600 tons @ Rs. 42 per ton | 25,200 0 0 | 25 3 2 |
| 3. Labour @ Rs. 160 per ton—50 tons | 8,000 0 0 | 8 0 0 |
| 4. Repairs and Maintenance | 6,000 0 0 | 6 0 0 |
| 5. Consumable stores | 2,300 0 0 | 2 8 0 |
| 6. Establishment | 11,000 0 0 | 11 0 0 |
| 7. Depreciation of plant valued @ Rs. 15,000 @ 7% .. | 1,050 0 0 | 1 0 10 |
| 8. Overhead including Taxes | 10,000 0 0 | 10 0 0 |
| 9. Packing Charges | 3,500 0 0 | 3 8 0 |
| | <hr/> | <hr/> |
| | 1,41,012 8 0 | 141 0 2 |
| Less Credit for materials recovered—5 tons Caustic potash @ Rs. 1,000 per ton | 5,000 0 0 | 5 0 0 |
| | <hr/> | <hr/> |
| Net cost of production | 1,36,012 8 0 | 136 0 2 |
| Add profit 15% | 20,401 14 0 | 20 6 5 |
| | <hr/> | <hr/> |
| Total cost (including profit) | 1,56,414 6 0 | 156 6 7 |